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An Assessment of Wildlife-Friendly Practices in Allotment Gardens

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Abstract

Rapid urbanisation has led to severe biodiversity loss, an issue of global concern. There is therefore growing interest in the potential for urban green spaces, such as allotments, to protect biodiversity. However, the benefits of allotments are highly dependent on how individual plot holders manage their plots. A survey was conducted in six Southampton allotments to assess the extent to which people engage in wildlife-friendly activities and any constraints they face in doing so. While the majority of the plot holders surveyed were found to be aware of wildlife-friendly activities and related allotment rules, some of them did not implement these activities even if they were aware of their benefits for wildlife. The main reasons given were lack of knowledge and money. Provision of information via more experienced plot holders, an emphasis on the benefits of wildlife-friendly activities for the gardener and provision of free materials (e.g. ponds, bird boxes) could all contribute to increasing the biodiversity-conservation potential of allotments.

Key words: Allotments, biodiversity, **gardening**, wildlife, urban green space.

Introduction

The rapid global increase in population growth in the last decades is leading to habitat destruction and fragmentation (Distefano, 2005). While in 1900 a mere 10% of the global population were urban residents, that percentage now exceeds 50% and will continue to rise even more in the next 50 years (DESA, 2008). High concentrations of transportation in urban areas are responsible for changes in biogeochemical cycles, e.g. leading to an increase in carbon dioxide (CO₂) and other greenhouse gases which have an adverse impact on Earth's climate, air quality and most importantly biodiversity (Pataki et al., 2006). Species richness and evenness for most biotic communities usually declines as a result of urbanisation and suburbanisation (Grimm, 2008). In addition, urbanisation shrinks the diversity of native species at globally as well as regional scales (Fig.1). For instance, urban sprawl in northern latitudes appears related to declines in abundance of some migratory birds in southern latitudes (Valiela, 2007).

(McKinney, 2006). There is a growing interest in the potential of urban green space to combat the negative economic and environmental effects of urbanisation (Ahrne, 2009). Urban green spaces, including private and community gardens, parks and allotments, have a remarkable effect on biodiversity conservation, community health and human well-being (Pataki et al., 2006).

ALLOTMENT GARDENS

Allotment gardens are a type of community gardens, which emerged in the UK in the 19th century to meet the needs of suitable areas for labourers to grow their own fruits and vegetables (Irvine, 1999). The majority of allotment sites today are owned by local authorities who make the sites available to allotment associations solely for the purpose of growing of vegetables, fruits and cut flowers. The most significant feature of allotment gardens is that parcels of land are tended individually by plot holders and their families (NLGN, 2009).

Allotment cultivation gained in importance during the Second World War because of the impact of hostilities on food availability. For instance, in Southampton, local people were encouraged to have allotments, e.g. through an annual Victory Garden Show which took place at Bitteme and Woolston Road (Harrison, 1967). As food became more easily available after the war, there was a rapid decline in allotments (Irvine, 1999). However, the interest in allotment cultivation has been increasing recently due to

people's concerns with environmental issues such as biodiversity and wildlife protection (Howe and Wheeler, 1999).

Protection of biodiversity is embodied in several laws and regulations in the UK. At the national level, the UK government followed up on its declaration at the Earth Summit in Rio de Janeiro in 1992, by publishing a Biodiversity Action Plan in 1994 (JNNC,2011). In addition to national activity, local actions include partnerships between local communities, landowners, a range of voluntary and public organisations, and local authorities to protect wildlife and encourage biodiversity. The law relating to allotments is embraced in various Allotment Acts announced between 1908 and 1950. Thus, allotment gardening can be said to be the only recreational activity which has its own legislation (NSALG, 2011). The Small Holdings and Allotments Act 1908 is the main statute on allotments for England and Wales. It gives local authorities a duty to provide sufficient allotment places to meet demand. In addition, allotments are linked to Local Agenda 21 (LA 21) initiatives (which encourage biodiversity) by many local. The most significant amendments relating to protecting wildlife and conserving nature in allotments were detailed in The Local Government Act 1972 – these include restrictions on the use of pesticides and herbicides, and rules for keeping of livestock or chickens in the allotment gardens.

Allotment gardens and human well-being

Allotment gardens are considered to have the potential to promote human health and well-being (Berg, 2010). A survey in the Netherlands found that allotment gardeners over 62 years scored significantly better than non-allotment owners in the same age category in terms of physical conditions and health issues (Berg, 2010). This direct correlation between health conditions and allotment gardens is supported by Sheppard (2002) who argues that contact with the natural elements such as soil can contribute to human well-being and health. Also, as pointed out by Horrocks (2007), there is a strong relationship between fresh vegetable and fruit growing and the health of allotment gardeners. For instance, allotment gardeners grow their own vegetables without any commercial purpose and for this reason they avoid the use or overuse of some chemicals (Farmer, 2006). As a source of fresh fruit and vegetables, allotments support a healthy diet for allotment holders and their families.

A high proportion of the UK population suffers from obesity, a plethora of health issues such as heart disease, diabetes and back problems (Farmer, 2006). The important contribution of allotment gardens to the UK's national public health strategy – as a source of both physical exercise and healthy food – was emphasised in the fifth report of the Select Committee on Environment, Transport and Regional Affairs (1998).

Allotment gardens provide additional benefits to the community as well as to individual holders or growers (Irvine, 1999). For instance, during the 1930s depression and also

during the inflation crisis time, allotment gardens met the needs of the people when their revenues were insufficient to purchase adequate food. Allotment gardens can bring the people together who have common interests. It also offers an opportunity for contact between generations. Psychological benefits of allotments include increased access to the atmosphere and to the peace of the outdoor environment thereby providing opportunities for self-reflection, recreation and restoration as well as increased access to "growing things" Sempik et al. (2005). Fuller et al. (2007) categorised the psychological benefits of green space as follows: *reflection* (ability to think and gain perspective); *distinct identity* (degree of feeling unique or different through association with a particular place); *continuity with past* (extent to which sense of identity is linked to green space through continuity across time); and *attachment* (degree of emotional ties with the green space).

Allotment gardens and biodiversity benefits

in addition to the principal food, **physical health**, social and psychological benefits of allotments outlined above, there is a growing interest in the potential biodiversity benefits of allotment gardens. They are typically scattered around urban landscapes, often in areas where private gardens are small and there may be few other green spaces (DTLR, 2002). They therefore contribute to provision of green 'corridors' for wildlife such as foxes and birds to move from one green space to another. Evidence from the National Society of Allotments and Leisure Gardeners shows that allotments have on average up to 30% higher species diversity than urban parks and other green areas (CCB, 2002). Locally they also provide microhabitats for smaller wildlife such as hedgehogs, frogs and a large range of insects. Activities that are considered to

encourage wildlife in allotment plots include provision of food (e.g. seeds for birds and pollen for insects), shelter (e.g. bird boxes, bat boxes, reptile refuges), habitat (e.g. ponds or log piles) as well as keeping bonfires and pets under control (DCLG, 2007).

Allotment providers specify what kinds of activities tenants are required to undertake (e.g. keeping their plots tidy) and others that are prohibited (e.g. use of some chemicals and planting of certain invasive species (SSC, 1997). Some councils, such as Cardiff City Council, promote activities to increase the environmental sustainability of allotments; including the highlighting the importance of hedges and trees on allotment sites (Cardiff Caerdydd, 2005). Warwickshire Biodiversity Action Plan includes a training and education facility for plot holders, including in nature conservation techniques to increase natural predators e.g. bat and bird boxes, beetle banks (Warwick, 2005). However, most information provided to plot holders relates to how to improve their food yields, with no consistent requirement that plots are gardened in a wildlife-friendly manner. Since plot holders sign their tenancy agreements, they have control over the planting, maintenance and cultivation activities they apply in their plots. This means that species richness and habitat provision may vary between plots and allotments depending on the allotment holders' perceptions and practices. There appears to be very little research which documents how well allotment plot holders understand the extent to which they should or could implement wildlife-friendly practices and how these practices could be encouraged to increase the biodiversity conservation potential of allotments.

The aim of this paper, therefore, is to explore the extent to which allotment owners implement wildlife-friendly activities in their plots and to understand barriers to wider implementation. In particular it will:

1. Assess how well plot holders know the rules relating to wildlife-friendly activities;
2. Identify any relationships between allotment holders' characteristics and the extent to which they implement wildlife-friendly activities in their plots; and
3. Explore why plot holders do not use wildlife-friendly gardening activities and how they could be encouraged to do so.

Methodology

Selection of the Study Sites

Southampton is the largest city in the county of Hampshire on the south coast of England. Urbanization in Southampton is at the stage of “suburbanization”, showing a growing population within the whole agglomeration at 1.48% (Zhang, 2007).

Southampton city has 1,600 plots at 28 sites dotted around the city, one of them is currently closed (BBC, 2007). The allotment gardens in Southampton range from 13 to 257 plots in size.

For this study, six allotment gardens (Table 1 and Fig. 2) in and around urban areas of Southampton were selected. The allotment gardens were selected to represent the

smallest and largest in the city, also taking into account advice from the City Council Allotment officer and the logistics of reaching them.

Table 1. Name and size of allotment sites visited and number of questionnaires and interviews carried out at each.

Allotment Garden's Name	Number of Plots	Number of Questionnaires	Number of Deep Interviews
Radcliffe Road Allotments	13	6	3
Bitteme Road Allotments	15	7	2
Sandhurst Road Allotments	18	5	5
Muddy Bottom East Allotments	151	7	3
Oakley Road Allotments	178	10	2
Weston Allotments	254	15	10

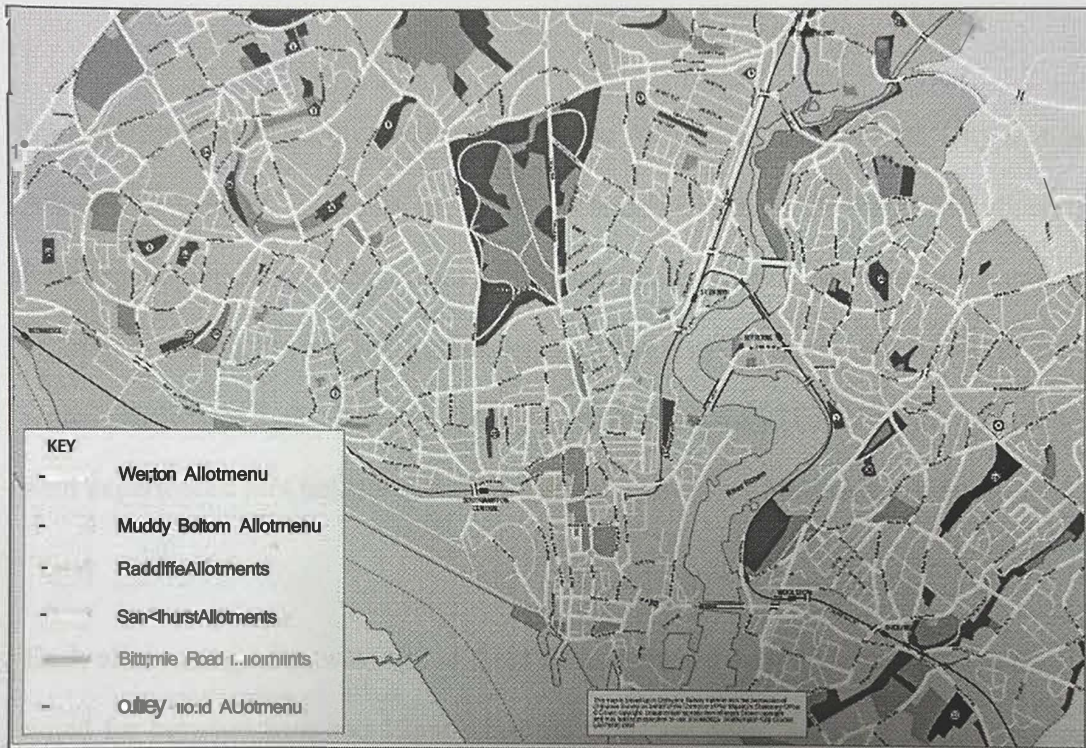


Fig.2. A map of Southampton showing the location of selected allotment gardens.

(Source: Southampton City Council, 2007)

Data Collection Methods

Data collection consisted of a mixture of in-depth interviews, questionnaire surveys and direct observations. Furthermore, an Internet survey was trialled without success.

In-depth interviews were carried out with Sue Ashdown, Southampton City Council's Allotments Officer, in order to obtain information about the different allotments, focusing in particular on the extent to which wildlife-friendly practices are required or promoted. During pre-visits the Allotments officer also introduced the author to the site representatives and plot holders. Other in-depth interviews (Table 1) were carried out with experienced plot holders and site representatives using a checklist of questions.

Each allotment garden was visited three times between July and Nov 2011 with visits timed for between 8am and 12pm when the gates are open. All plots at each site were visited and questionnaires delivered to plot holders where available, and collected in a short while later.

The questionnaire contained 17 questions **that** had been formulated in order to be given to plot holders. A brief introduction **stated** the purpose of the research and tried to grab the attention of plot holders to **encourage** their participation. The questions were organized from general to **specific** with the more important and complicated questions being at the end of the questionnaire. In addition, the questions were grouped into topics in an appropriate sequence which is important for logical order and the linkage between

the questions. As interviewees might have a variety of backgrounds, simple language was used to facilitate understanding (Stone, 1993).

The questionnaire consisted of two main parts. Classification questions were included to enable comparisons between different groups of plot holders i.e. gender, age, employment status, etc. Attitudinal questions were asked to find out the opinions and perceptions of plot holders about biodiversity. Topics included reasons for having an allotment, awareness of allotment rules, awareness and implementation of wildlife-friendly activities, any difficulties in doing so, sources of information and ideas about ways to encourage greater uptake of wildlife-friendly activities.

Four types of questions were used; dichotomous questions, **multiple choice** questions, rank order scaling questions and open-ended questions (RMKB, 2006). Classification questions were generally asked in multiple **choice** formats while open-ended questions gave plot holders an opportunity to give their personal feedback in a text box. The survey was trialled with four plot holders in Weston Allotment Gardens, following which one of the rank order scaling questions was changed to multiple choice.

An electronic survey, containing the same questions as the paper questionnaire, was organized on the University of Southampton's I-Survey page and the link sent to allotment garden association websites. No usable responses were obtained by this route.

A final research tool was direct observation of the number and types of wildlife-friendly practices implemented in the allotments.

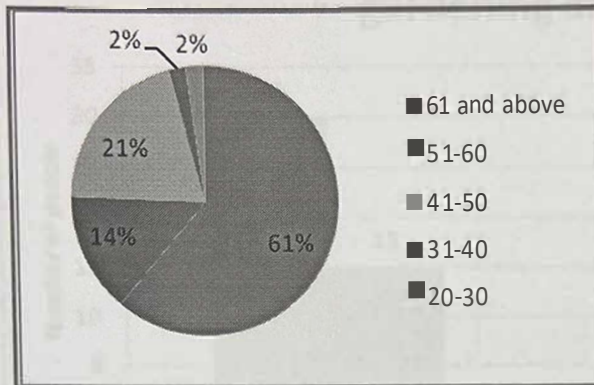
Data Analysis

Interview data were analysed thematically. Questionnaire data were entered into an excel spreadsheet and quantitative data analysis carried out using SPSS. This included descriptive statistics and, for ranking style questions, non-parametric t test and chi-square tests.

Results

A total of 50 questionnaires were completed in the six allotments. The majority (96%) of plot holders are over 41 years old with 61% being over 61 (Fig. 3a). The majority of respondents were male (Fig. 3b) which matched personal observations that most people active in plots were men.

(a)



(b)

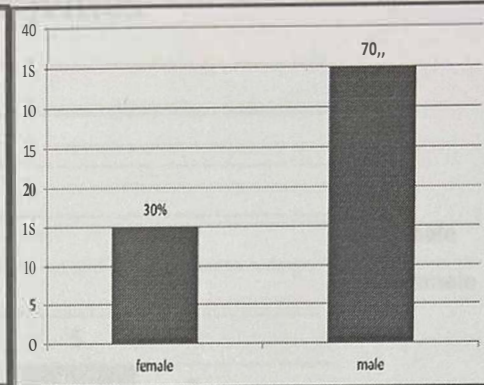


Fig. 3.a. The ages of the allotment interviewees.

Fig. 3.b. The genders of the allotment interviewees.

When plot holders were asked about whether they are **aware of wildlife-friendly** gardening activities or not, 90% responded positively. The 10% who are not aware are all men (Fig 4). When asked whether they apply these activities in their plots or not, 80% of plot holders answered the question positively; once again, all negative responses were from male respondents (Fig. 5). Lack of money and knowledge were the main reasons given for not applying these activities in their plots (Fig. 6), with lack of time also mentioned by plot holders. In response to the question about what would encourage them to apply wildlife-friendly activities in their gardens, 60% cited free materials (Fig.7).



Fig. 4. The number of plot holders that consider themselves to be aware of wildlife-friendly gardening activities.

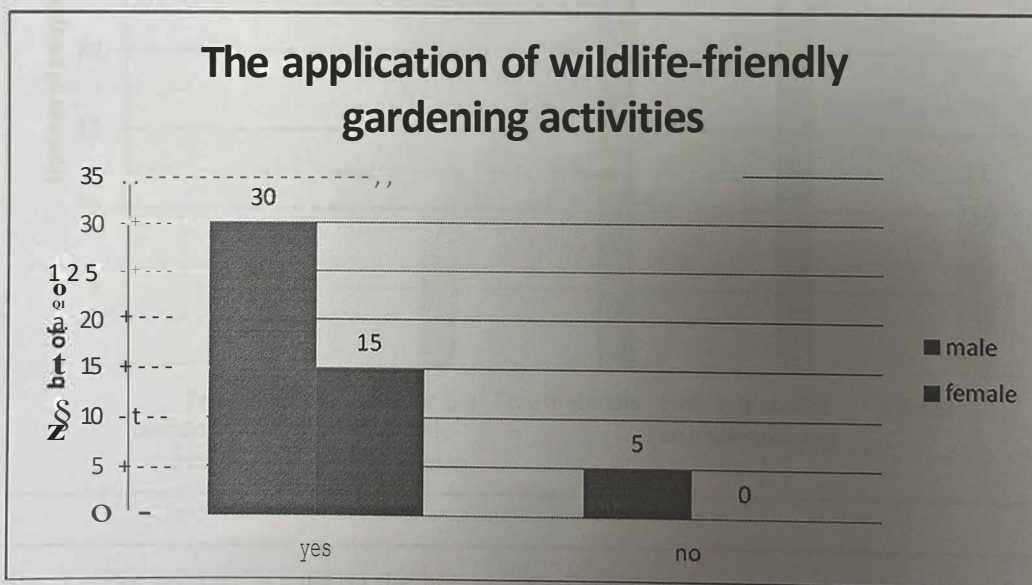


Fig. 5. The application of wildlife-friendly gardening activities by gender.

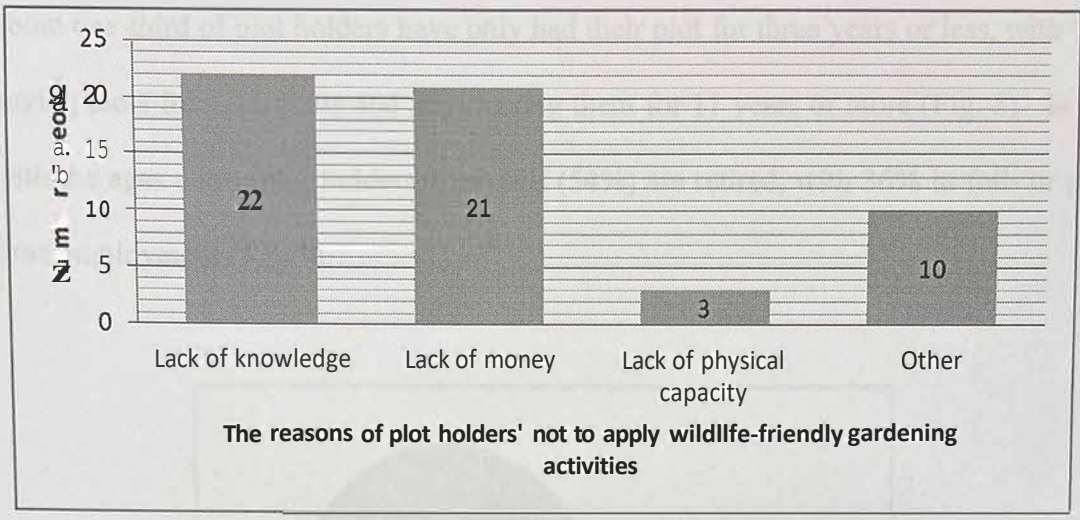


Fig. 6. The main reasons why plot holders do not apply wildlife-friendly gardening activities in their plots.

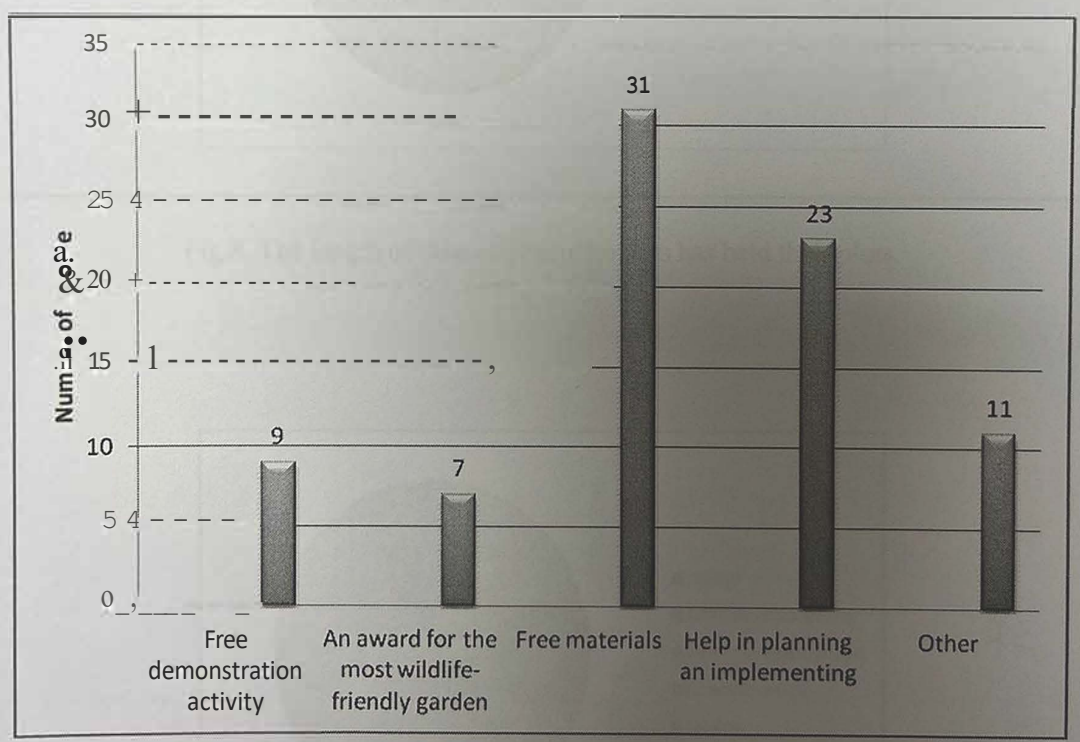


Fig. 7. Plot holders' views on the best ways of encouraging the implementation of wildlife-friendly activities.

About one-third of plot holders have only had their plot for three years or less, with 44% having plots for 4-10 years and 26% having them for 11 years or more (Fig. 8). In line with the ages of the plot holders, over half (54%) are retired, with 36% in full- or part-time employment (Fig. 9).

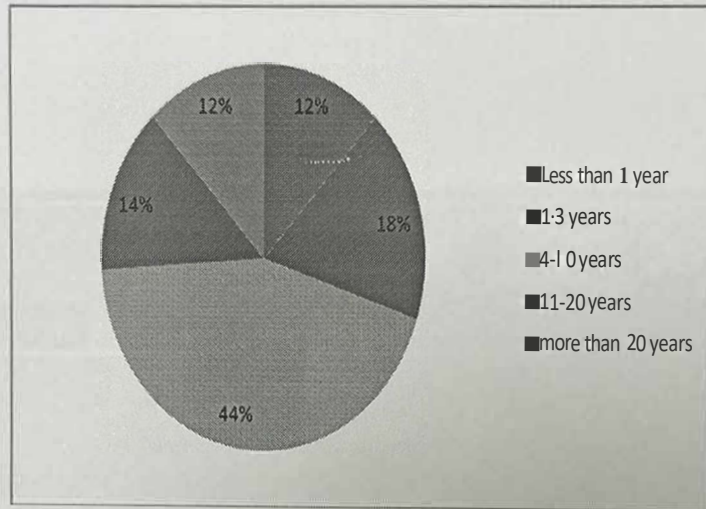


Fig.8. The length of time allotment holders has held their plots.

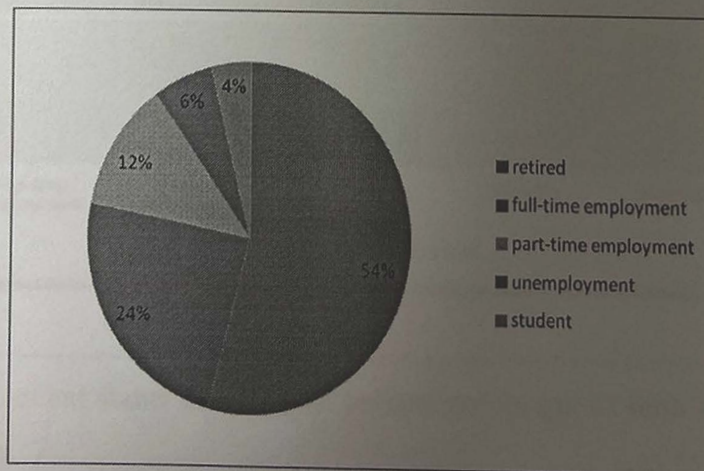


Fig.9. The employment status of plot holders.

As shown in Fig 10, there has been an increase in the number of employed people holding plots in the last 10 years, with their numbers outstripping those of retirees for the first time in the past year.



Fig.1 O. Employment status of allotment holders and length of time they have had their allotment plots.

In terms of time spent at the allotments none of the full-time employed plot holders visited their plots on a daily basis, typically visiting their plots just 2-3 times in a month. In contrast, the majority of retired people visited their plots daily or 2-6 times in a week (Fig 11). The frequency of visits to plots is closely linked to age, with 96% of over 61 year olds visiting their plots at least twice per week (Fig. 12).

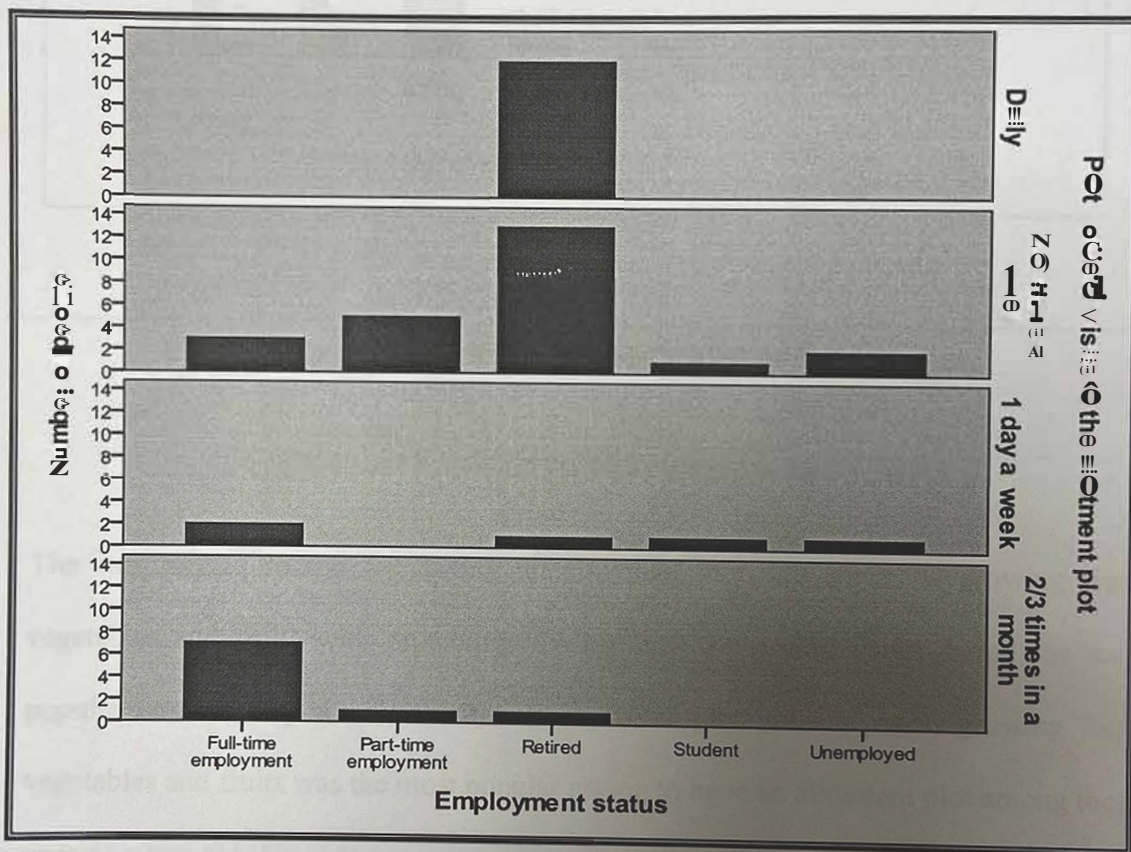


Fig. 11. Frequency of plot visits by plot holders of different employment status.

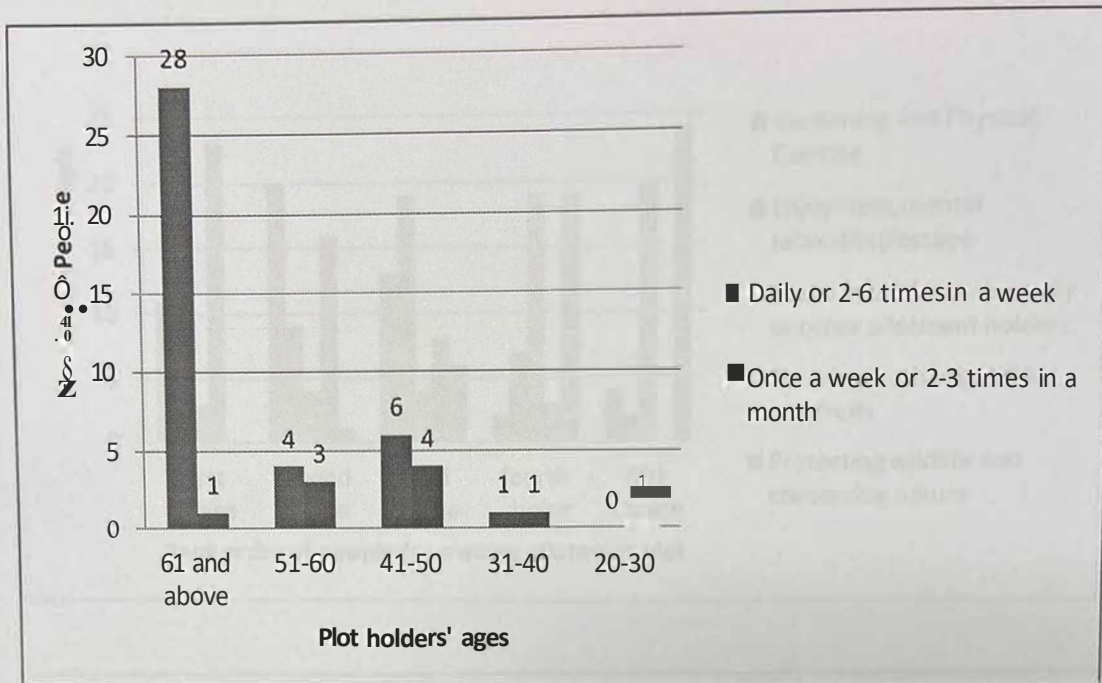


Fig.12. Frequency of plot visits by plot holders of **different** ages.

The first ranked reason for having an **allotment** plot was given as growing fresh vegetables and fruits with protecting **wildlife** and conserving nature being the least popular answer (Fig. 13, Table 2). in terms of plot holders' ages, growing fresh vegetables and fruits was the most popular **reason** to have an allotment plot among those over 61 years old (Fig. 14).

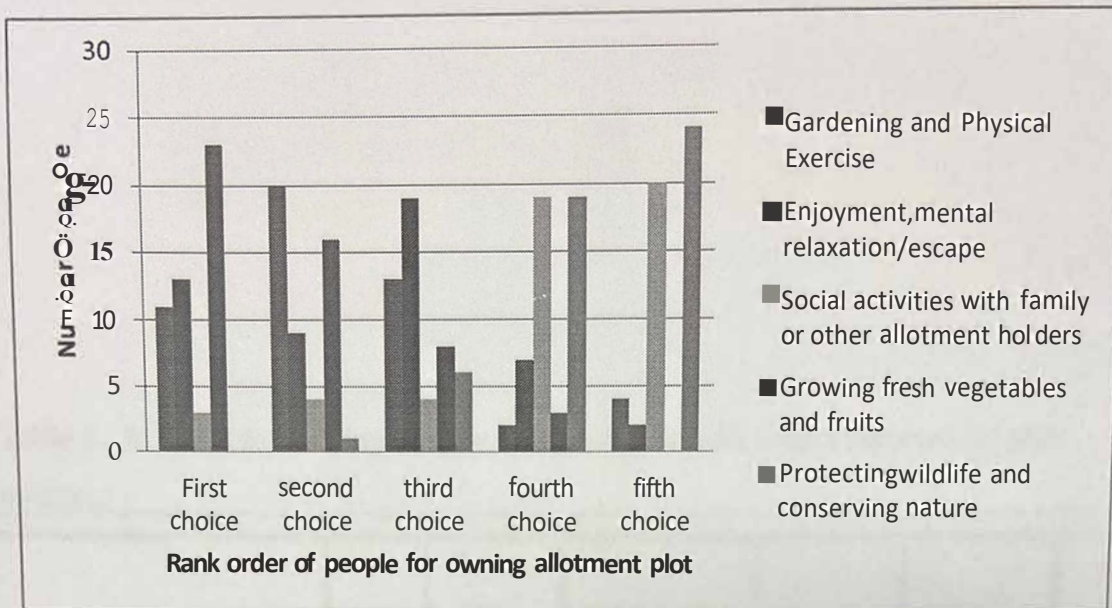


Fig. 13. The main reasons of plot holders' for having an allotment plot.

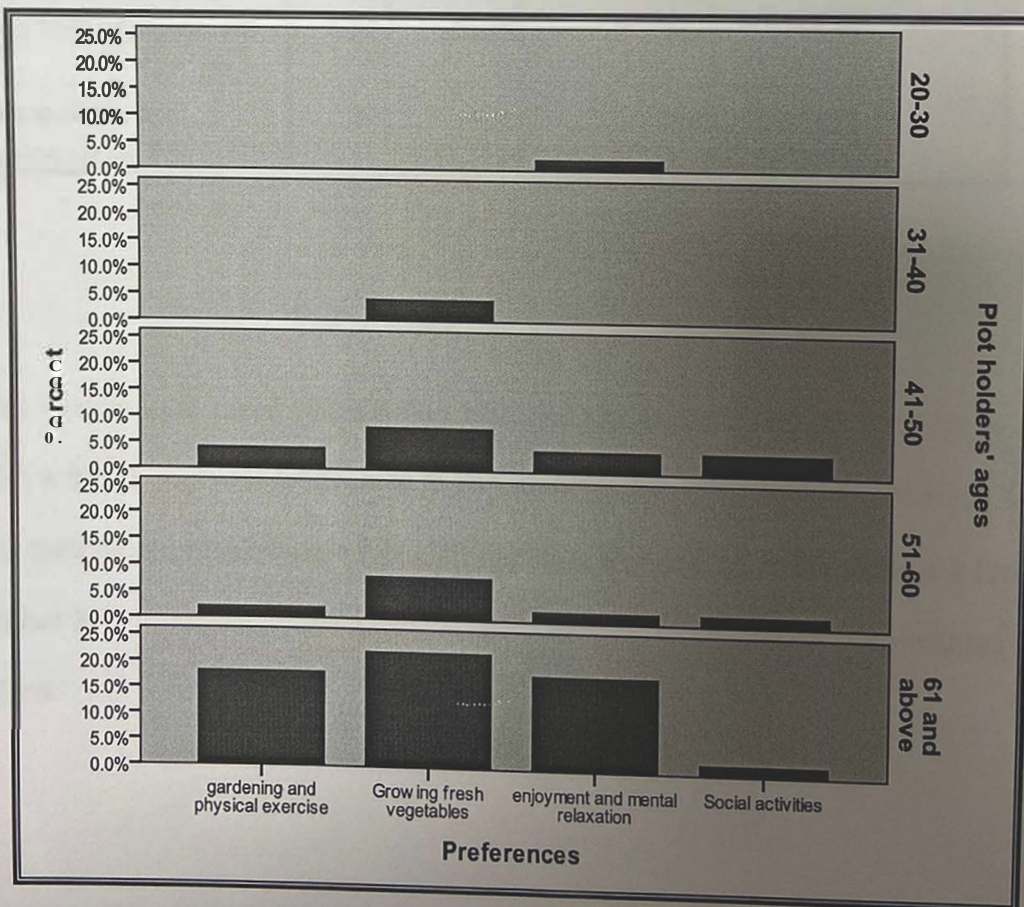


Fig. 14. First-ranked reason for having a plot given by plot holders of different ages.

Table 2. Reasons for owning an allotment and their rank orders selected by plot holders.

	N	Mean	Std. Deviation	Minimum	Maximum	Rank Order
Gardening, physical exercise	50	2.38	1.141	1	5	2Qoint)
Enjoyment, mental relaxation/escape	50	2.50	1.129	1	5	2Qoint)
Social activities with family	50	3.98	1.169	1	5	4
Growing fresh vegetables and fruits	50	1.82	.919	1	4	1
Protecting wildlife and conservina nature	50	4.32	.768	2	5	5

Plot holders were asked whether they have the plot on their own, as a family or shared with a friend, and who is involved in decision-making. Fifty percent of the plot holders had their plots on their own, while 30% had their plots and took decisions as a family. A further 20% of respondents shared their plots and the associated decision-making with a friend.

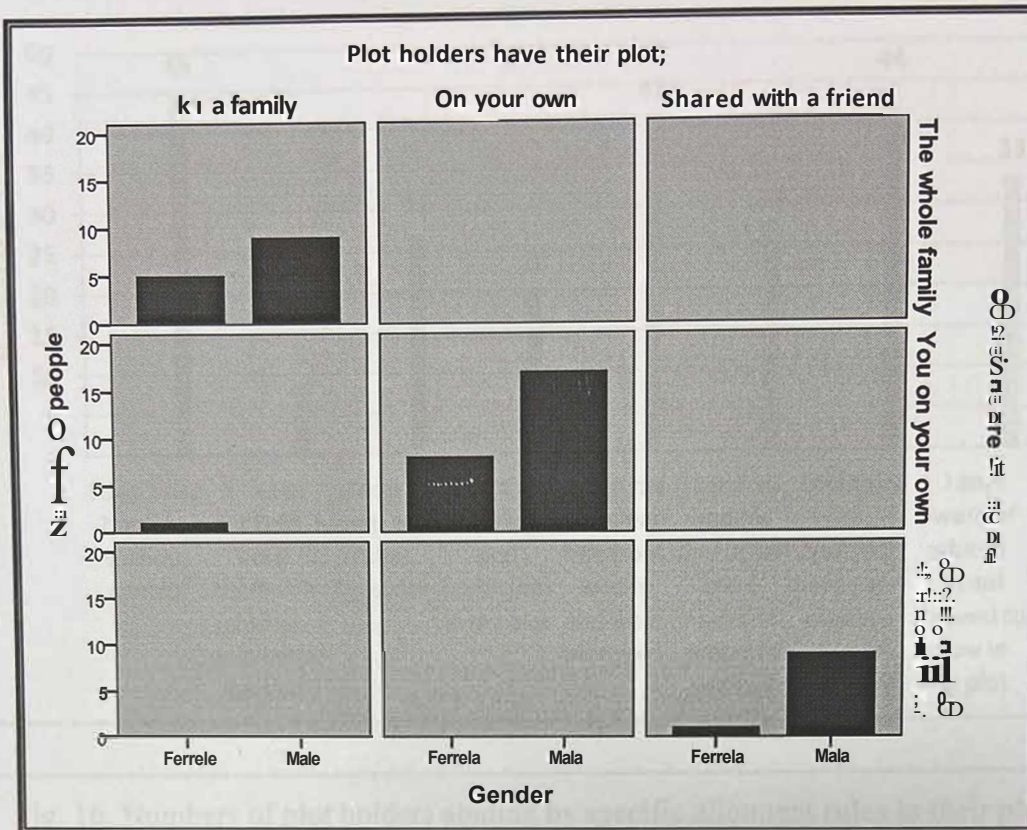


Fig. 15. The owner of allotment plots grouped by gender of plot holders and identity of decision-maker.

Almost all (98%) plot holders claimed to be aware of the allotment's rules and regulations. However, the responses relating to whether people abide by specific rules were more variable (Fig. 16) with the **highest** compliance associated with keeping bonfires under control, keeping plots **weed-free** and containing compost heaps.

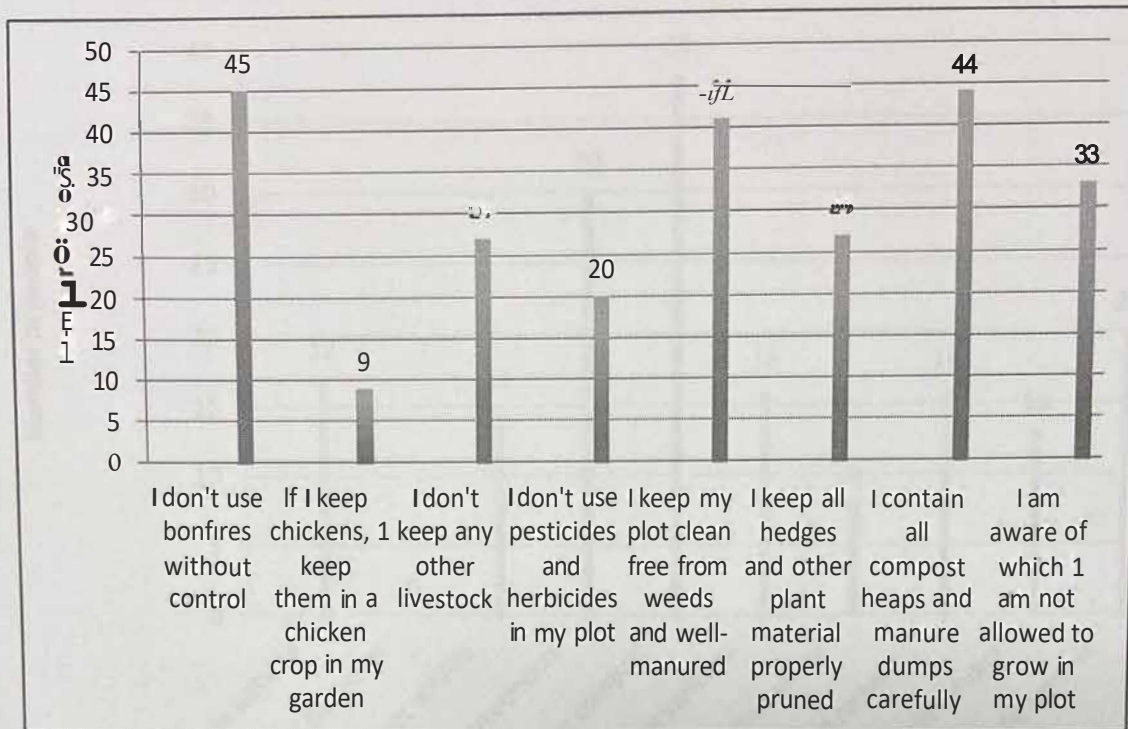


Fig. 16. Numbers of plot holders abiding by specific allotment rules in their plots.

Plot holders were asked to indicate which wildlife-friendly features were present in their plots (Fig. 17). The most popular wildlife-friendly gardening activity was making and using their own compost (at 76%) followed by avoidance of chemical sprays and treatments (60%). Also, 40% of people provide food for animals and they visit their plots daily as I can get the information from my interviews. Seventy percent of the plot holders obtained information about wildlife-friendly activities either from other experienced plot holders and/or from books/tv. The welcome pack provided to new allotment holders was considered to be the least important source of information about wildlife-friendly techniques (Fig. 18).

spends on their allotment. The results of the questionnaire show a clear correlation between number of visits and plot holders' employment status: while the full-time employed tend to visit only 2-3 times per month, presumably because of time constraints, more than 50% of retired people visit their allotment daily or 2 to 6 times in a week.

Although it is illegal to dump rubbish and waste on allotment sites, a waste dump was detected in Bitteme Road Allotment Gardens (Fig.19). Furthermore, two compost bins were found in the incorrect place. Thomson (2005) states that plot holders may not stick to the rules if it proves advantageous for them not to. For instance, a plot holder in Bitteme Allotment Gardens claimed that, a mouse, living in her incorrectly placed compost bin, has a significant role in the lifecycle of bumblebees. She believed that many species of bumblebee nest in old mouse holes, possibly attracted by the smell, although this author found no literature to support this idea. **Another experienced** plot holder in Sandhurst Allotments claimed that an untidy plot protects wildlife by providing places for hiding and nesting, especially for newts under log piles. This is in direct conflict with the approach of keeping the allotment tidy and clean as supported by garden designer and TV presenter Wombwell (2010) who believes it is good not just for aesthetic reasons but also to increase the success of the plots because of reduced pests, weeds and associated diseases.

These two opinions illustrate the **apparent** conflict between keeping a plot tidy to produce fruit and vegetables **more successfully** and maintaining wildlife. A possible

solution for this issue could be to separate fruit and vegetable growing areas on allotment plots from wildlife areas.



Fig.19. The household waste and dumped rubbish in Bitteme Road Allotments

(Source: taken by me)

The UK and EU regulations and allotment rules **restrict** the use of pesticides and herbicides in allotment gardens. If plot holders have to use pesticides and herbicides, they have to keep their use to a minimum, and should not allow the chemicals to reach neighbouring plots (Allotment Rules, 2010). The pesticides and herbicides even in small quantities can damage the wildlife badly, being especially harmful for birds, toads and hedgehogs (Smith, 1987). However, only 40% of respondents in this study claimed to avoid using pesticides and herbicides in their plots. The representative of Sandhurst Allotment Garden described that although they used to see hedgehogs and frogs, they have not seen them in their allotment for some years. She believed that the reason for the decline is the increased use of slug pellets in the allotment: “the hedgehogs

accumulate the poison when they eat those poisoned slugs". Interviews undertaken in this study revealed that people use other methods to combat slugs such as yeast and garlic spray instead of slug pellets. However, a few people did not use these alternative methods, even though they are cheaper than slug pellets, because they did not want to see dead slugs in their plots.

Although 90% of respondents knew that they are not allowed to use bonfires without control, they considered that this was in order "not to disturb neighbours". However, bonfires pose a real danger for wildlife. For instance, hedgehogs often nest for hibernation in dry places such as piles of leaves, so they can be badly injured by bonfires (HAWR, 2010). This suggests that plot holders may not be aware of the wildlife-friendly reasons for some activities prohibited or required by the allotment regulations.

Wildlife-Friendly Gardening Activities

In addition to activities required or prohibited by allotment regulations, many respondents were aware of and implemented other wildlife-friendly activities. Provision of food for wildlife was mentioned by 40% of plot holders, who also mentioned that they visited their plots daily. They provided food such as fat balls and bird seed for birds, serap for foxes, and nuts for hedgehogs and robins. A couple of people had bird feeders in which they provided dried mealworms, sweets and peanuts for sparrows, blue tits and green/gold finches. **Besides** food, a few plot holders also put out a bowl of water for birds and foxes. One female plot holder in Oakley Allotment Garden stated that

benefits of ponds to the wildlife, with one highlighting the need to protect the world's declining amphibian population. A couple of people explained that they had ponds in their plots to attract frogs in order to let them eat slugs. It seems then that most people do not necessarily have ponds in their plots to conserve nature or protect wildlife, but rather for the utilitarian reason of wanting to protect their produce against slugs. This agrees with Peacock (2007) as based on his survey's results, people are more likely to engage in activities in their plots of direct benefit to themselves.

Ponds can be made more attractive for a variety of invertebrates by adding different exotic plants besides native plants. One experienced plot holder stated that he just used native water plants such as nardoo or reeds. Also some wildlife concerned plot holders provided shelter, rest areas and food for tadpoles and adult frogs in the ponds. The number of pond animals can also be increased by building up algae. To ensure this, water should be clean and not contaminated with nutrients (Natural England, 2007). However, in Bitterne Allotments almost all ponds were observed to be brownish or not clean. The allotment officer explained that they cannot force the plot holders to keep ponds clean because there are no rules or regulations about it (Allotment Acts). Yet, certain animals are protected under the **Wildlife and Countryside Act 1981** and should not be damaged or injured. When plot holders were asked to name these protected species, they correctly listed the common frog, toad, newts, etc.



Fig. 22 Small and brownish coloured pond in Radcliffe Allotment Garden

(Source: taken by me)

By far the most widespread wildlife-friendly activity for plot holders was making and using their own compost, perhaps because this is directly beneficial to their own activities, being both a useful means of removing organic waste and an important source of nutrients for the produce.

Planting native trees and shrubs to attract birds, butterflies or bees was practised by only 30% of plot holders. However, some of the plot holders with whom in-depth interviews were conducted, displayed a wide knowledge about these species, being able to name many species they planted to attract butterflies and bees. The Radcliffe Allotment representative complained that tenants there are not allowed to plant trees (which would provide nesting space for birds and food for squirrels) because their allotment is apparently too small.

Encouraging plot holders to practise wildlife-friendly activities

Respondents' most important source of information about wildlife-friendly gardening activities were books and TV, perhaps reflecting the large number of TV programmes dedicated to gardening. One plot holder explained that "If I see something on TV or in a book, I will make one", highlighting the influential role of TV (Allotment Diary, 2011). Almost as important as a source of information were experienced plot holders. Observations during site visits revealed that many wildlife-friendly activities (such as ponds or bird tables) were clustered in neighbouring plots. This may reflect the social function of allotments and the fact that people learn from their neighbours (Kollmuss, 2010). Not surprisingly, the Welcome pack provided to new tenants was considered the least important because it does not include a section about wildlife-friendly gardening activities within its 10 chapters. However, one of Cardiff Allotment future objectives is to include advice on wildlife gardening in the Allotment Gardeners Beginners Guide to encourage wildlife (Cardiff Caerdydd, 2005).

The information available to people is clearly, not sufficient as lack of knowledge was cited as the most important reason why people do not apply wildlife-friendly gardening activities. This was closely followed by lack of money, as well as a concern about lack of time. Respondents all agreed that they were not encouraged by the City Council or any other organization to implement these activities in their plots. They listed the provision of free materials and help in planning wildlife-friendly activities as the two things that would most encourage them in this area.

Three plot holders agreed that the best way to be involved in wildlife-friendly activities is in a group setting and through team work. This suggests that the help of some organizations (i.e. implementing and maintaining) could encourage plot holders to implement wildlife-friendly activities by bringing groups of people together to work out what they want to do in their allotment. Such a bottom-up approach is also supported by government and councils as it supports plot holders rather than forcing them (SGA, 2011). Information needs to be targeted particularly at men as women respondents were more likely to already be aware of and implementing wildlife-friendly activities. However, although men make up the majority of plot holders, several stated that they do not apply some techniques to their plot without asking their families, especially their wives, so family-oriented information activities would also be useful.

Conclusion

Allotment gardens cover an imprecise portion of land in towns and cities; however, they represent an important part of the urban green environment. The extent to which allotments make a real contribution to conserving biodiversity depends on how they are used by plot holders. In this context, the perception of plot holders' as to what constitutes a wildlife-friendly activity and how they should or could implement them is a significant factor.

The results presented in this paper suggest that most plot holders are aware of wildlife-friendly activities and tend to implement those that are required of them by the

allotment rules, specifically controlling their bonfires and minimising use of chemicals. However, most do not implement the many additional but non-obligatory activities (such as provision of food, shelter and habitat for different species) which could improve the biodiversity conservation potential of allotments. Lack of information and money are cited as the main constraints. The fact that experienced plot holders appear to be a crucial source of information for their neighbours suggests that they would be an effective focus for information campaigns. Furthermore, the results suggest that plot holders are principally concerned about their food production (though this may be changing with a new generation of more environmentally conscious allotment gardeners) and are often not aware of how different aspects of biodiversity can support this. Information provision should therefore focus on highlighting the practical importance of wildlife for pollination and pest control rather than the intrinsic benefits of biodiversity per se.

The conclusions of this study are limited by the small number of questionnaires (50) completed by allotment holders which prevent analysis of the statistical significance of the findings. Nevertheless, the trends observed were corroborated through in-depth interviews with key informants. Further research would be useful specifically to determine the cost-benefits of implementing wildlife-friendly activities and different methods of providing information and encouraging plot holders to engage in them.

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References

Ahmed K., Bratton, J., Elmaghrabi, T. 2009 Bumble Bees (*Bombus spp*) along a Gradient of Increasing Urbanization. *PloS One* 44(5).

Allotment Directory, 2011. *Allotment Vegetable Growing*. Available <http://www.allotment.co.uk> (accessed September 2011).

BBC 2007. *Can Living Can you dig this?* Available http://www.bbc.co.uk/1/health/allotment_articles/2006/03/20/allotments_feature.shtml (accessed September 2011).

Beckerman, A P 2007 Urban bird declines and the fear of cats. *Animal Conservation* 10(3):332-335.

Berg, A., Winsum Westra, M., Vries, S 2010. Allotment gardening and health: A comparative survey among allotment gardeners and their neighbours without an allotment. *Environmental Health* 9(7):2-12.

Bishop, P 2010. Assessing the potential of allotment gardening as an alternative method of obtaining vegetables to decrease carbon emissions from transport and production. Southampton.

Cardiff CABERYD 2005 *Allotment Strategy for Cardiff*.

CCB (Climate, Community and Biodiversity)-Action Plan. 2002. Available <http://www.caerphilly.gov.uk/countryside/pdf/actionplan/vol1-pt2-urban-habitats.pdf> (accessed September 2011).

Crouch, D. 1998. Reinventing Allotments for the twenty-first century: The UK Experience. *ISHS Acta Horticulturae*. XXV International Horticultural Congress, Part 13.

DCLG (Department for Communities and Local Government). 2007. A plot holder's guide.

DESA (Department of Economic and Social Affairs). 2008. World Urbanization Prospects: The 2007 Revision, New York.

Distefano, E. 2005. Human-Wildlife Conflict Worldwide: Collection of case studies, analysis of management strategies and good practices. Available http://www.fao.org/SARD/common/ecg/1357/en/HWC_final.pdf (accessed September 2011).

DTLR (Transport Local Government Regions). 2002. *Improving Urban Parks, Play Areas and Open Spaces*. Available <http://www.communities.gov.uk/documents/communities/pdf/131021.pdf> (accessed November 2011).

Farmer, A. 2006. Allotments for Healthy Living. Available <http://www.foodfutures.info/site/images/stories/a4hl%20allotments%20report.pdf> (accessed September 2011).

Fuller, R., Irvine K., Wright P., Warren P., Gaston K. 2007. Psychological benefits of green space increase with biodiversity. *Biology Letters* 3:390-394.

Goddard, A., Dougill A. J. and Benton 11 G. 2010. Scaling up from gardens: biodiversity conservation in urban environments. *Trends in Ecology* 25 (2):90-98.

Grimm, N. B., Faeth H., Golubiewski N., Riedman C., Bai X. 2006. Global Change and the Ecology of Cities. *Science* 319(586):756-760.

Harrison, S. J. 1967. *Allotments in the Urban Environment of Southampton*.

HAWRI (Harper & Row) Wildlife Research 2010. *Encouraging Through Knowledge a*
Natura. Available <http://www.harperandrowwildliferesearch.co.uk/uk/igahobofire.html> (accessed
September 2011).

Hörroek P. 2000. National Society of Allotment & Leisure Gardeners Limited.
Allotment Gardens: Food and Health City.

Howe J. and White P. 1999. Urban Food Growing: The Experience of Two UK
Cities Sustainable Development 7(1):13-24.

Hull Biodiversity Action Plan 2007 Summary. Kingston upon Hull City Council, East
Yorkshire. Available <http://www.hull.gov.uk/sites/pt/1/docs/page/home/planning/planning%20policy/available%20policies/biodiversity%20action%20plan.pdf> (accessed September 2011).

Irvine S.S., Johnson L., Peters K. 1999. Community gardens and sustainable land use
planning: A case study of the Aire Wharf community garden. *Sustainable Land Use*
44(1):33-46. 111:

IUCN (International Union for Conservation of Nature). Available <http://www.iucn.org/>
(accessed June 2011).

JNCC (Joint Nature Conservation Committee) 2011. *The UK Biodiversity Action Plan*.
Available <http://jncc.defra.gov.uk/default.aspx?page=5155> (accessed September 2011).

Kolmuss, A. 2010. Mind the Gap: Why do people act environmentally and what are the
barriers to pro-environmental behaviour? *Environmental Education Research* 8(3):239-
260.

Legislation.gov.uk 2011. Available <http://www.legislation.gov.uk/ukpga/Geo6/14/31>
(accessed September 2011).

McKinney, M. L. (2006). Urbanization as a major cause of biotic
homogenization. *Biological Conservation* 127(3):247-260.

McDonald, R., Kareiva R., Forman R. 2008. The implications of current and future urbanization for global protected areas and biodiversity conservation. *Biological Conservation* 141:1695-1703.

Miller, J. 2005. Biodiversity conservation and the extinction of experience. *Trends in Ecology and Evolution* 20(8):431-434.

Mougeout, J. A. 2005. *Agropolis: The Social, Political and Environmental Dimensions of Urban Agriculture*. Available <http://books.google.co.uk/books?id=esyCARLTSSOC> (accessed September 2011).

Natural England. 2007. *Garden ponds and boggy areas: havens for wildlife*. Sheffield. Available from www.naturalengland.co.uk (accessed September 2011).

Nature's Voice. 2011. *Planning and creating a wildlife-friendly garden*. Available http://www.rspb.org.uk/advice/gardening/wildlife-friendly_garden.aspx (accessed September 2011).

NLGN (New Local Government Network) 2009 -*Can you dig it? Meeting Community Demand for Allotments*. London. Available <http://www.nlgn.org.uk/public/2009/can-you-dig-it-meeting-community-demand-6r-allotments/> (accessed July 2011).

NSALG (National Society of Allotment & Leisure Gardeners Limited).2011. Available <http://www.nsalg.org.uk/page.php?article=547&name=Allotmen> (accessed September 2011).

Pataki D., Alig R., Fung A., Golubiewski N., Kennedy C., McPherson E. 2006. Urban ecosystems and the North American carbon cycle. *Global Change Biology* 12(11):2092-2102.

Questionnaire Design and Surveys Sampling. 2011. Available <http://home.ubalt.edu/ntsbarsh/stat-data/surveys.htm#rsi> (accessed September 2011).

Peacock, J. (2007). Centre for Environment and Society, Essex.

Peckerman, A.P, Boots M. and Gaston K. J. 2007. Urban bird declines and the fear of cats. *Animal Conservation* 1-6.

R.MKB (Research Methods Knowledge Based) 2006. Available <http://www.soci.alresearchmethods.net/kb/order.php> (accessed September 2011)

Sempik J., Aldridge J., Becker S. (2005). Health, Well-being and Social Inclusion Therapeutic Horticulture in the UK. *Final report of the research project "Growing Together" 5*: 3-11.

Sheppard, P. (2002). *Man in the Landscape*. Press. Athens, Georgia

Smith, G.J., 1987. Pesticide use and toxicology in relation to wildlife: Organ phosphorus and carbonate compounds. Res. Publ. 170, U.S. Fish and Wildlife Service, Washington D.C.

SSC (Southampton City Council) 2007. Allotments Information-Dig This.

SGA (Sustainable Gardening Australia) 2011. Available <http://www.sgaonline.org.au/?p=1263> (accessed November 2011).

Stone, D. H. 1993. Design a questionnaire. *BMJ Journals* **307:1264**.

Thomson, K. 2005. *A Growing Passion- The Story of Southampton's Allotments*. Southampton.

Valiela, I., Martinetto, P. 2007. *Bioscience* **57(360)**. Press.

Warwickshire, Coventry and Solihull Local Biodiversity Action Plan. 2005. *Action for Wildlife*.

Wild about Gardens, (2011).
<http://www.wildaboutgardens.org.uk/thingstodo/intwohours/make-a-log-shelter.aspx>.

Wombwell, S. 2010. *Allotment Gardeningfor Dummies*. Chichester: John Wiley.

Zhang, P. (2007). *Modelling the Effect of Urbanization on the Transmission of an Infectious Disease* **211 (2008):166-185**.

Zwarseveen, M. 1996. *A Plot's of one own: Gender Relations and Irrigated Land Allocation and Policies in Burdna Faso*. Research Report 10 thesis, International Irrigation Management Institute 2.